

## THE ORB-WEAVER GENUS *KAIRA* (ARANEAE: ARANEIDAE)

Herbert W. Levi: Museum of Comparative Zoology, Harvard University; Cambridge, Massachusetts 02138 USA

**ABSTRACT.** Adult specimens of *Kaira* are rarely collected and the females are difficult to separate. The few specimens in collections represent 14 species, all American. Five species are new: *Kaira cobimcha* from southern Brazil; *K. dianae* from southeastern Peru; *K. erwini* from Peru; *K. shinguito* from northern Peru; *K. tulua* from Depto. Valle, Colombia. The female of *K. hiteae* is described and *Araneus sexta* is transferred to *Kaira*.

*Haliger* is a new synonym of *Kaira*, with *H. corniferus* a synonym of *K. altiventer*. *Kaira obtusa* and *Wagneriana minutissima* are synonyms of *K. gibberosa*. Doubtful synonyms are *Caira capra* of *K. altiventer*, and *Macpos monstrosus* of *K. gibberosa*.

In the past many authors named spiders without adequately illustrating them, and without comparison to other species in the same genus. The current approach is to name new species only as one aspect of a comprehensive revision of the entire genus, including the examination and comparison of old holotypes (vouchers for species names), and adequate illustrations of both sexes. While such revisions are required to make it possible to determine spiders, only a few revisions of Neotropical spiders are available.

*Kaira* specimens are uncommon in collections. According to Stowe (1986), the spiders spin small webs, hanging upside down below the web and attracting male moths that fly into a basket formed by their legs (see below). The attractant, apparently a moth pheromone, resembles that of the Bolas spiders *Mastophora*. *Mastophora* and *Kaira* both belong to the same orb-weaver family, Araneidae, but are not closely related within the family.

### METHODS

This revision is one of a series for American orb weavers (Levi 1993). The procedures used are similar to those described in previous revisions (Levi 1993).

Eye measurements, as in previous papers, are expressed as ratios of the diameter (with cornea in profile) to those of the anterior median eyes (Levi 1993, figs. 27, 28). Distances between eyes of the anterior row are expressed as diameters of the anterior median eyes (in profile); distances between eyes of the posterior row are given as diameters of the posterior median eyes (in profile). The height of the clypeus, the distance be-

tween anterior median eyes and the edge of the carapace, is given in diameters of an anterior median eye and is measured below the eye (Levi 1993, fig. 28f). These measurements are approximate.

The maximum length of the abdomen was measured. In this revision “humps” refers to paired protrusions on the abdomen, and “tubercles” refers to small projections on the abdomen.

The collections used for this study came from the following institutions: (AMNH)—American Museum of Natural History, New York, United States; N. Platnick, L. Sorkin. (BMNH)—The Natural History Museum, London, England; P. Hillyard, F. Wanless. (CAS)—California Academy of Sciences, San Francisco, United States; W. J. Pulawski, D. Ubick. (MACN)—Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina; E. A. Maury. (MCN)—Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil; E. H. Buckup. (MCP)—Museu de Ciências, Pontifícia Universidade Católica, Porto Alegre, Rio Grande do Sul, Brazil; A. A. Lise. (MCZ)—Museum of Comparative Zoology, Cambridge, Massachusetts, United States. (MLP)—Museo de Universidad Nacional, La Plata, Argentina; R. F. Arrozpide. (MNHN)—Muséum National d’Histoire Naturelle, Paris, France; J. Heurtault, J. Koor, C. Rollard. (MNRJ)—Museu Nacional, Rio de Janeiro, Brazil; A. Timotheo da Costa. (MUSM)—Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru; D. Silva D. (MZSP)—Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil; P. Vanzolini, L. Neme, J. L.

M. Leme. (USNM)—National Museum of Natural History, Smithsonian Institution, Washington, D.C., United States; J. Coddington. I thank the curators of these collections for loaning specimens. The revision of *Kaira* was started with National Science Foundation support grant no. DEB 76-115568. I thank M. Stowe for information. I am obliged to several readers, especially L. Leibensperger, L. R. Levi and E. H. Buckup for finding many errors. I thank J. C. Coken-dolpher and C. D. Dondale for reviewing the manuscript and suggesting many improvements.

### KAIRA SPECIES

#### *Kaira* O. P.-Cambridge

*Kaira* O. P.-Cambridge, 1889:56. Type species *K. gibberosa* O. P.-Cambridge, 1889, designated by F. P.-Cambridge, 1904:522.

*Caira* Simon, 1895:894. Changed spelling for *Kaira*, an invalid emendation.

*Pronarachne* Mello-Leitão, 1937:9. Type species by monotypy *P. aries* Mello-Leitão, 1937 (= *Kaira altiventer* O. P.-Cambridge). First synonymized by Levi, 1977.

*Macpos* Mello-Leitão, 1940:59. Type species by monotypy *M. monstrosus* Mello-Leitão, 1940 (= *Kaira gibberosa* O. P.-Cambridge). First synonymized by Levi, 1977.

*Haliger* Mello-Leitão, 1943:180. Type species by monotypy *H. corniferus* Mello-Leitão, 1943 (= *Kaira altiventer* O. P.-Cambridge). NEW SYNONYMY. *Note on synonymy:* *Haliger corniferus* is an early-instar immature described as a theridiosomatid.

**Diagnosis.**—*Kaira* differs from other araneids in having the abdomen attached close to the middle of its venter, rather than at its anterior end, with the axis of the abdomen almost at a right angle to the cephalothorax (Figs. 13, 56), except in *K. hiteae* (Fig. 85), *K. cobimcha* (Fig. 89), and *K. sexta*. The female has tubercles on the surface of the abdomen (Figs. 40, 55, 65, 78) or just on the anterior humps (Figs. 12, 14), except in *K. hiteae* (Fig. 85), *K. cobimcha* (Fig. 89), and *K. sexta*. The distal ends of the first to third tibiae and the metatarsi and tarsi of females are armed with many setae and macrosetae (Figs. 13, 18, 56, 60), indistinct in males. All species have dwarf males (Figs. 12, 22, 47).

Unlike other araneids, *Kaira* females have a small and lightly sclerotized epigynum, often with a flat keel-like scape (Figs. 3-5, 23-25, 48-50); the epigynum is difficult to study.

Males lack macrosetae on the palpal patella. (Males of other araneid genera have 1-3 such

setae.) The median apophysis (M in Fig. 27) bears two flagella, originating from the middle of the apophysis, behind a row of teeth on its distal end (Figs. 27, 28, 41, 42), in *K. sexta* only one flagellum. The median apophysis of *K. sexta* appears turned on its long axis, having the single flagellum pointed "down" (Levi 1991, fig. 342). The distal articles of the anterior legs have only an indistinct row of setae, most of one size.

*Kaira* females and immatures can be confused with species of *Pozonia* (Levi, 1993). The genitalia separate *Kaira* species from species of *Ocrepeira* and *Pozonia*, which may have a similarly shaped abdomen and have setae on distal articles of the first legs, but are not closely related (judging by the structure of the genitalia).

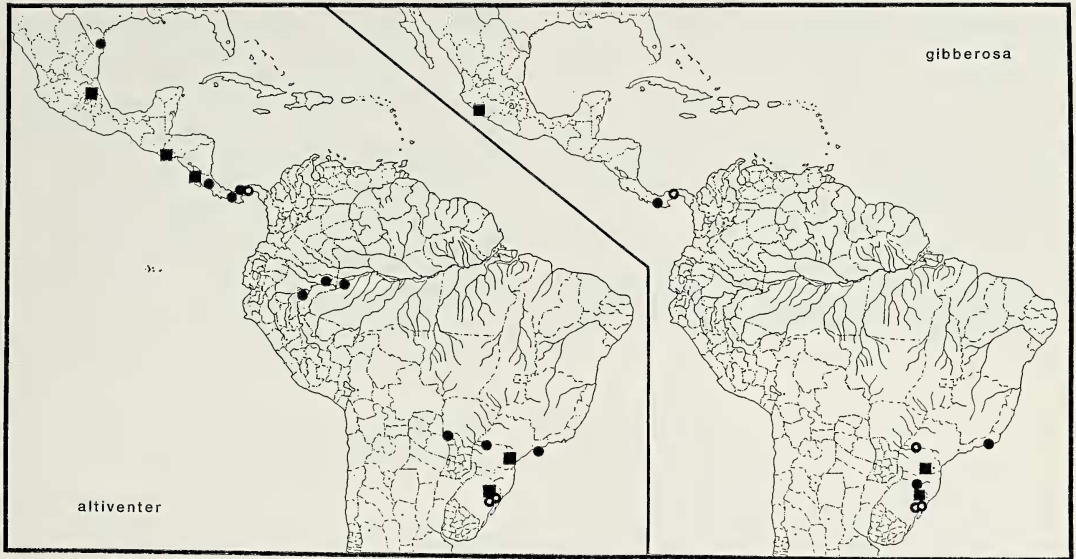
**Description.**—Pale yellow-white with scattered, small, white, brown and black spots forming no distinct pattern (Figs. 12, 38, 40, 60), or transverse bands in *K. hiteae*, *K. cobimcha* and *K. sexta* (Figs. 85, 89). Carapace low, almost as wide as long, with eye region about half the width of the carapace (Figs. 1, 18, 19). Height of clypeus about equal to diameter of an anterior median eye. Eyes small and subequal in size; median ocular quadrangle usually narrower behind than in front; lateral eyes on a slight tubercle (Fig. 19). Median ocular quadrangle square or narrower behind than in front. Tibiae slightly sinuous; tarsi, metatarsi, and distal portions of tibiae armed with many setae (Figs. 13, 18, 22). Abdomen, because of its relatively posterior attachment, almost perpendicular to carapace. Abdomen differs in shape in different species, usually having tubercles, often having dorsal humps (Figs. 26, 36, 51, 60, 85).

Epigynum small, lightly sclerotized, often with median keel and posterior median plate (Figs. 3-5). Posterior median plate variable in shape in different species (Figs. 24, 49, 58, 67). Tip of keel perhaps torn by male when mating.

Shape of sternum may differ among species (not illustrated) and among individuals of same species.

Male *Kaira* less than half total length of females and with less pigment (Fig. 12). Presumably due to dwarf size, *Kaira* males lack the usual modifications of male araneids: they lack patellar macroseta, the endites are without teeth, the first coxae without hook, and second tibiae not modified. In males, the humps on the abdomen are smaller than those of females, and usually without tubercles (Figs. 22, 47). Unlike the epigynum, the palpus is well developed. Median apophysis (M in





Map 1.—Distribution of *Kaira altiventer* and *K. gibberosa*. Circles = female records, squares = male records, open circles = immature records.

Fig. 27) has two flagella and a distal row of teeth; distal hematodocha is present; embolus tip is hidden between terminal apophysis (A) and conductor (C in Figs. 27, 28). Shape of conductor separates males of *Kaira* species (C in Fig. 28).

**Relationship.**—The two flagella of the male median apophysis (M in Fig. 27) are believed homologous to those found in *Aculepeira*, *Amazonpeira* and *Metepeira*; the distal row of teeth on the median apophysis is also found in some species of *Metepeira*, *Aculepeira* and *Amazonpeira*. While in these genera the presence of two median apophysis flagellae in males usually correlates with a tapering, pointed scape on a lightly sclerotized (except *Aculepeira*) epigynum in females, the scape is often flattened in *Kaira*.

**Natural history.**—Although a *Kaira* species was known to Hentz (1850), nothing was known of their habits until recently. In response to my 1977 paper, Karl T. Stone (5 March 1978) sent his report of observations made on a *Kaira alba* female in a wide-mouth jar. The spider remained on the underside of the lid, without a web, until a fly was introduced. The spider dropped on what seemed a single thread, one-half (12 mm) inch long, and hung there until the fly blundered into her, and she clamped her legs around it, killing it.

More recently Mark Stowe (1986) reported on *Kaira alba*. They do not make an orb and specialize in catching male moths. The spider builds a small trapezoidal web, remade every 20 min, containing two triangular zigzags of threads. The

spider hangs upside-down by the fourth leg on the lower and shorter parallel edge of the trapezoid spread by the other legs (Stowe 1986, fig. 5.7b). When a moth flies into the basket formed by the spider's legs, the spider drops on a short line while clasping and biting the moth. After the moth stops struggling it is wrapped in the usual araneid fashion. The wrapped moth is placed on a trapeze line between the spider's fourth legs and the hunting posture is resumed. As many as eight moths are wrapped together before the spider feeds on the package. The moths caught are listed by Stowe (1986). Since all moths caught are male, and these present only a small proportion of the available moth species, Stowe assumes that the spider uses a pheromone as an attractant. Two young observed had the same hunting posture as the adult. Although the zigzag lines are minimally viscid, they may be homologous to the viscid spiral in the araneid orb; here they play no part in food capture. The *Kaira* diurnal resting posture with legs I and II extended forward resembles that of tetragnathids. I agree with Stowe that the moth catching behavior must be independently evolved from that of *Mastophora*.

The egg sacs have an outside covering of fluffy silk and are made on top of each other (Stowe 1986, fig. 5.9). (This Stowe illustration also shows the top of the white spider, above a hanging moth.)

**Matching sexes.**—Immature specimens can be determined with uncertainty by the shape of the abdomen. Males have never been collected with

females. When revising the North American species (Levi 1977), I found males labeled *K. alba* by W. Gertsch and A. Archer in the collections. This appears to be correct because the male of *K. alba* has the same distribution (*e. g.*, Florida) as the female and does not fit with any other female araneid. *Kaira alba* is one of the two species whose sexes are matched with some confidence. The others are *K. hiteae* and *K. sexta*, in which the abdomen of the male is similar to that of the female.

**Distribution.**—*Kaira* species are known only

from the Americas (Maps 1, 2). *Kaira sabino* and the male of *K. hiteae* are illustrated in Levi (1977), *K. sexta* in Levi (1991, figs. 339-342).

**Misplaced species.**—*Epeira electa* Keyserling, 1883, placed in *Kaira* by Levi, 1991, is probably an *Araneus*.

*Kaira dromedaria* O. P.-Cambridge, 1893, is a *Pozonia* (Levi 1993).

*Kaira granadensis* Mello-Leitão, 1941a, is a *Pozonia* (Levi 1993).

#### KEY TO *KAIRA* FEMALES

1. Abdomen with pair of humps, without tubercles, shield-shaped (Figs. 85, 89) ..... 2  
Abdomen otherwise (Figs. 12, 36, 51, 78) ..... 4
- 2(1). Abdomen wider than long (Fig. 89) ..... 3  
Abdomen longer than wide (Fig. 85); south-central United States ..... *hiteae*
- 3(2). Epigynum in ventral view with two transverse bars (Fig. 86); southern Brazil (Map 2) .... *cobimcha*  
Epigynum in ventral view with only corners of anterior bar showing (Levi 1991, fig. 339); Guatemala to Amazon area (Map 2) ..... *sexta*
- 4(1). Epigynum with a median notch in a posterior transverse bar (Levi 1977, fig. 141); Arizona (Map 2) ..... *sabino*  
Epigynum otherwise; not in Arizona ..... 5
- 5(4). Abdomen with a long median anterodorsal projection (Figs. 69, 73, 74) ..... 6  
Abdomen with a pair or more of humps or slight median projections (Figs. 12, 36, 60) ..... 7
- 6(5). Abdomen drop-shaped (Fig. 69); northern Argentina (Map 2) ..... *candidissima*  
Abdomen a long cone (Figs. 73, 74); southeastern Brazil to northern Argentina (Map 2) .... *conica*
- 7(5). Posterior of abdomen without tubercles (Figs. 12-18, 26, rarely one pair of small humps, Levi 1977, fig. 134) ..... 8  
Posterior of abdomen with humps or tubercles (Figs. 40, 51, 65, 78) ..... 9
- 8(7). Epigynum with longitudinal projection (Figs. 23-25); southeastern United States to northern Mexico (Map 2) ..... *alba*  
Epigynum with transverse projection (Figs. 3-11); Texas to southern Brazil (Map 1) ..... *altiventer*
- 9(7). Abdomen much longer (or higher) than wide (Fig. 35) ..... 10  
Abdomen as wide or wider than long (Figs. 65, 78) ..... 11
- 10(9). Abdomen rounded anteriorly (Fig. 51); Colombia (Map 2) ..... *tulua*  
Abdomen with a pair of dorsal humps (Figs. 35-40); Mexico to southern Brazil (Map 1) ... *gibberosa*
- 11(9). Abdomen rectangular (Figs. 55, 78) ..... 12  
Abdomen subcircular (Figs. 60, 65); Peruvian Amazon region ..... 13
- 12(11). Epigynum with extended scape (Fig. 75-77); southeastern Brazil (Map 2) ..... *echinus*  
Epigynum with a short scape (Figs. 52-54); Peruvian Amazon region (Map 2) ..... *erwini*
- 13(11). Epigynum as in Figures 61-64; Map 2 ..... *dianae*  
Epigynum as in Figures 57-59; Map 2 ..... *shinguito*

#### KEY TO *KAIRA* MALES

(Males of *K. candidissima*, *K. conica*, *K. dianae*, *K. erwini*, *K. sabino*, *K. shinguito*, *K. tulua* are unknown.)

1. Median apophysis twisted, with only one flagellum (Levi 1991, fig. 342); Guatemala to Amazon area (Map 2) ..... *sexta*  
Median apophysis not twisted, with two flagella (Figs. 20, 21, 79, 80, 90, 91) ..... 2
- 2(1). Abdomen wider than long (Fig. 81); conductor of palpus as in Figure 80; from Bahia State, Brazil to northern Argentina (Map 2) ..... *echinus*  
Abdomen longer than wide (Figs. 22, 47, 92); conductor of palpus otherwise ..... 3



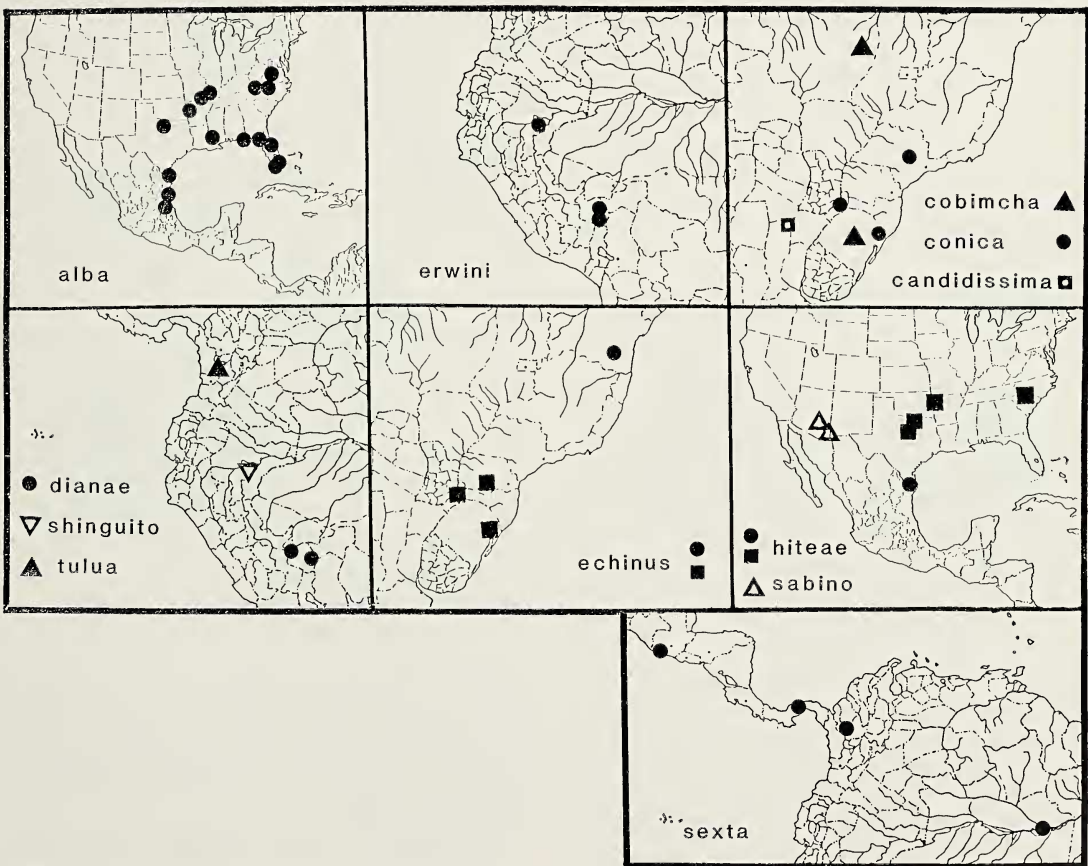
- 3(2). Abdomen dorsum with an anterior dorsal shield (Fig. 92); terminal apophysis with "transverse" sclerotized edge (Fig. 91); Mato Grosso, Brazil (Map 2) ..... *cobimcha*  
 Abdomen without dorsal shield (Figs. 22, 47) ..... 4
- 4(3). Conductor with a distal tooth on side of terminal apophysis (Figs. 42, 44, 46); Mexico to southern Brazil (Map 1) ..... *gibberosa*  
 Conductor without distal tooth on conductor (Figs. 21, C in 28) ..... 5
- 5(4). Median apophysis of palpus with only 3 or 4 large teeth (Figs. 20, 21); Texas to southern Brazil (Map 1) ..... *altiventer*  
 Median apophysis with more than 6 teeth (M in Figs. 27, 28) ..... 6
- 6(5). Conductor with dark distal swelling overhanging subdivided lateral pockets (Levi 1977, fig. 140); terminal apophysis bluntly pointed (Levi 1977, fig. 139); south-central United States (Map 2) ... *hiteae*  
 Tip of conductor facing flagella (C in Fig. 28); terminal apophysis sharply pointed (A in Fig. 27); southeastern United States to northern Mexico (Map 2) ..... *alba*

*Kaira altiventer* O. P.-Cambridge  
 Figures 3–22; Map 1

522, pl. 51, fig. 10, ♀ Levi, 1977:218, figs. 130–137, ♀, ♂.

*Kaira altiventer* O. P.-Cambridge, 1889:56, pl. 3, fig. 13, ♀. Female holotype from Veragua [Veraguas Prov.], Panama, in BMNH, examined. Keyserling, 1892: 62, pl. 3, fig. 48, ♀. F. P.-Cambridge, 1904:

? *Caira spinosa* Simon, 1897:478. Female lectotype designated by Levi, 1977 and imm. paralectotype from São Paulo de Olivença, Amazonas State, Brazil, and Pebas, Depto. Loreto, Peru in MNHN, examined. First synonymized by Levi, 1977.



Map 2.—Distribution of *Kaira* species. Circles of *K. echinus* and *K. hiteae* = female records, squares = male records.

? *Caira capra* Simon, 1897:479. Immature holotype from Paraguay in the MNHN, examined. NEW DOUBTFUL SYNONYMY.

*Pronarachne aries* Mello-Leitão, 1937:9, fig. 10, ♀. Female holotype from Itatiaia, Rio Grande do Sul in MNRJ, examined. First synonymized by Levi, 1977.

*Haliger corniferus* Mello-Leitão, 1943:180, fig. 18, imm. Immature holotype from Rio Grande do Sul in MNRJ, lost. Brignoli, 1983:239. NEW SYNONYMY.

**Synonymy.**—The holotype of *Caira spinosa* is a large, mature individual, 13.5 mm total length, abdomen 10.3 mm high, with only one pair of tubercular humps and tubercles between (Figs. 14, 15). The *Caira capra* holotype is immature (5.8 mm total length) and lacks some of the tubercles on the humps of the abdomen (Fig. 18). The holotype of *Pronarachne aries* has a flat triangular scape (Figs. 9–11) as in *K. altiventer* but the abdominal humps are much thinner than in other females (Figs. 16, 17, 19). The holotype of *Haliger coniferus*, originally placed in Theridiosomatidae, is only 2.5 mm total length, lacks tubercles on the humps and on the posterior of the abdomen, and has a thin white line going from the tip of one hump to the tip of the other, as do other specimens from this area (Fig. 12). Coddington (1986), in his study of theridiosomatids, considered *Haliger* unrecognizable, but it had been misplaced in that family. None of these specimens has posterior tubercles on the abdomen.

**Description.**—*Female from Paraná State, Brazil:* Carapace yellowish, cephalic region with tiny, irregular black spots. Chelicerae, labium, endites spotted orange. Sternum orange with brown line all around. Coxae orange, with dark brown spots; legs orange with tiny black spots. Dorsum of abdomen with posterior part darker than anterior and with minute stipples, a light transverse line between humps (Fig. 12), and larger black spots on tubercles; sides and venter spotted. Eyes subequal in size. Anterior median eyes 1.5 diameters apart. Posterior median eyes 1.2 diameters apart. Height of clypeus equals 1.4 diameters of the anterior median eyes. Sternum elongate, extending between fourth coxae. Abdomen with two humps, bearing asymmetrical tubercles (Figs. 12, 13). Total length 10 mm. Carapace 4.2 mm long, 3.8 wide, behind lateral eyes 1.8 wide. First femur 5.4 mm, patella and tibia 6.7, metatarsus 3.3, tarsus 1.2. Second patella and tibia 5.4 mm, third 2.9, fourth 3.5. Abdomen 9.4 mm high.

*Male from Hidalgo, Mexico:* Color as in female

but legs with wide, dark rings, and sides of the abdomen with irregular dusky spots having a colorless center (Fig. 22). Posterior median eyes 1.2 diameters of anterior medians, laterals 1 diameter. Anterior median eyes 1.2 diameters apart, 1 diameter from laterals. Posterior median eyes their diameter apart, 2.1 diameters from laterals. Height of clypeus equals 0.9 diameter of the anterior median eyes. Abdomen with a pair of anterior humps (Fig. 22). Total length 2.0 mm. Carapace 1.00 mm long, 0.84 wide, behind lateral eyes 0.53 wide. First femur 1.06 mm, patella and tibia 1.30, metatarsus 0.71, tarsus 0.47. Second patella and tibia 1.00 mm, third 0.58, fourth 0.76. Abdomen 1.58 mm high.

*Note:* Males and females have not been collected together but were matched by Levi, 1977, because they have physical similarities and were collected in Mexico and Central America.

*Variation:* Total length of females 7.0 to 13.5 mm, males 1.9 to 2.2. Illustrations (Figs. 3–5, 12, 13) were made from a female from Paraná State, Brazil and a male (Figs. 20–22) from Hidalgo State, Mexico. Some females have the humps curved, with their tips approaching and almost touching, forming an “O”. The illustration (Levi 1977) fig. 134, was made of a female from Edinburg, Texas; unlike all others, it had a pair of posterior tubercles. The immature holotypes of *C. capra*, *H. corniferus* and the immature specimen from Montenegro, Rio Grande do Sul, all lack tubercles on the humps of the abdomen (Fig. 18).

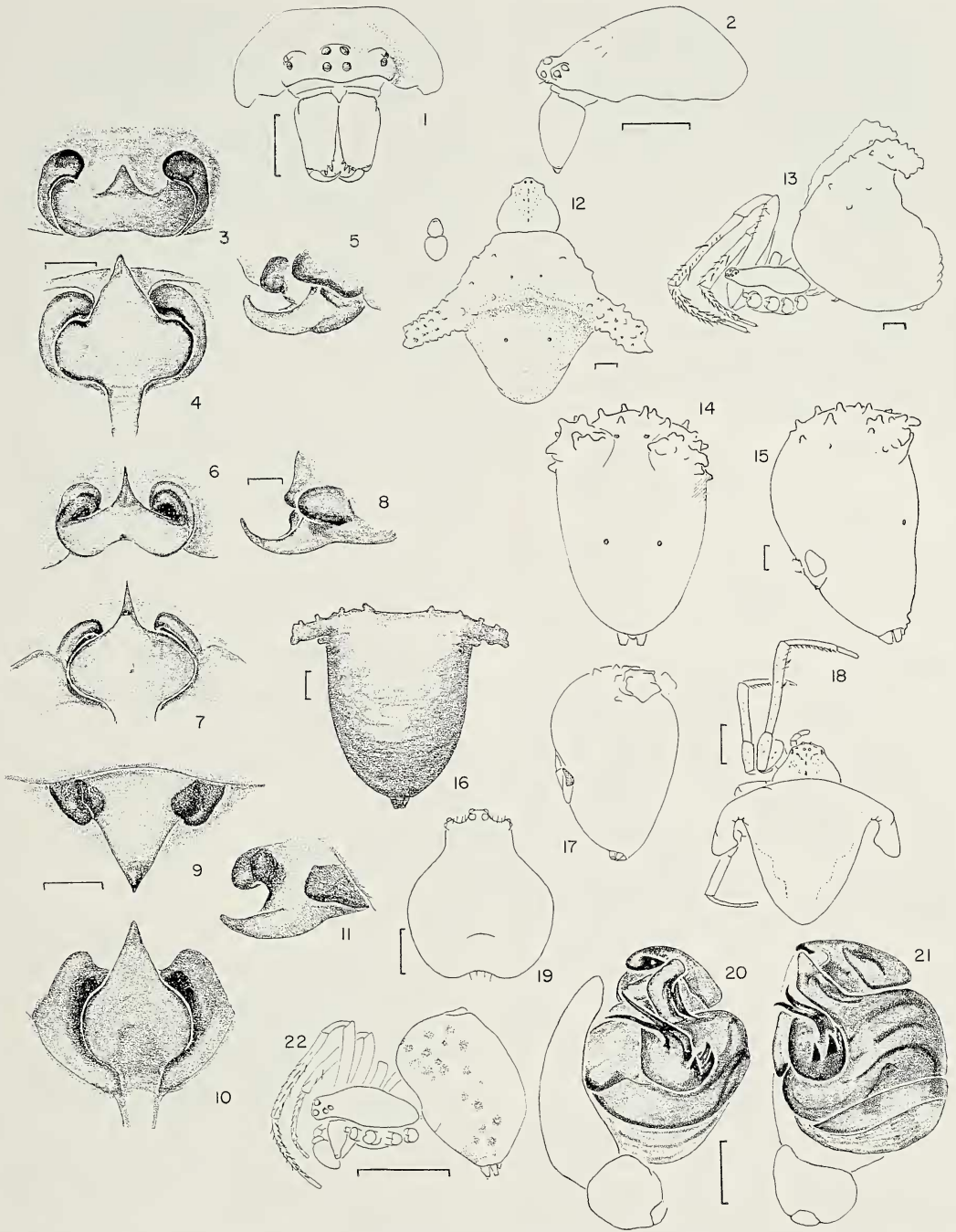
**Diagnosis.**—The epigynum of the female, unlike that of *K. alba*, has a flat, triangular, curved scape, the tip projecting anteriorly (Figs. 3, 6) and, like *K. alba* but unlike others, no humps or tubercles on the posterior of the abdomen (Figs. 12–18). The tiny male can be separated from others by having a palpus with only three or four long, black teeth on the distal end of the median apophysis and by the shape of the conductor, pointed and longest on the side of the dark terminal apophysis (center and 1100 h of Fig. 21).

**Natural History.**—A male from Texas was collected in low shrubs; another was the prey of a *Trypargilum nitidum* wasp in Costa Rica. One female in Peru was found hanging on a thread, another was obtained at the same location by fogging the canopy.

**Distribution.**—Southern Texas to southern Brazil (Map 1).

**Additional specimens examined.**—MEXICO. Hidalgo: El Salto, 22–23 April 1967, ♂ (W. Peck, CAS).





Figures 1–22.—*Kaira* species: *K. alba* carapace and chelicerae (1, 2); 1, frontal; 2, lateral. *K. altiventer* (3–22); 3–17, 19, female; 3–11, epigynum; 3, 6, ventral; 9, anterior; 4, 7, 10, posterior; 5, 8, 11, lateral; 12, dorsal with small male, same scale; 13, 15, 17, lateral; 14, 16, posterior; 19, carapace; 20–22, male; 20, 21, left palpus; 20, mesal; 21, ventral; 22, lateral; 3–5, 12, 13, from Paraná State, Brazil; 6–8, 14, 15, holotype of *Caira spinosa*; 9–11, 16, 17, 19, holotype of *Pronarachne aries*; 18, immature holotype of *Caira capra*; 20–22, from Hidalgo State, Mexico. Scale lines = 1.0 mm, of genitalia = 0.1 mm.

ELSALVADOR. *San Salvador*: January, March 1954, ♂ (J. B. Boursol, AMNH). COSTA RICA. *San José*: San Antonio de Escazu, 1400 m, 9 October 1982, ♀ (W. Eberhard SAI-73, MCZ), November 1988, ♀ (W. Eberhard, USNM). PERU. *Loreto*: Río Samiria, 29 May 1990, ♀ (D. Silva D, MUSM), 20 May 1990, imm. (T. Erwin, D. Silva D, MUSM). BRAZIL. *São Paulo*: Ilha São Sebastião, 28 Jan. 1951, ♀ (MZSP 6608). *Paraná*: Rôlandia, 1948, ♀ (A. Maller, AMNH); Almirante Tamandaré, 8 Aug. 1984, ♂ (C. C. Costa, MCN 12,500). *Rio Grande do Sul*: Montenegro, 1 September 1979, imm. (H. Bischoff, MCN 6431); Ponta Grossa, Porto Alegre, 7 May 1976, imm. (A. A. Lise, MCN 4241); Triunfo, 15 September 1977, imm. (A. A. Lise, MCN 6492); Viamão, 22 October 1988, ♂ (A. B. Bonaldo, MCN 17953). PARAGUAY. *Concepción*: Apa, Aug. 1909, ♀ (AMNH).

*Kaira alba* (Hentz)

Figures 1, 2, 23–28; Map 2

*Epeira alba* Hentz, 1850:20, pl. 3, fig. 7. Female from North Carolina, destroyed.

*Kaira alba*: - Levi, 1977:216, figs. 117–129, ♀, ♂. Stowe, 1986: 115, fig. 5, 7 (web).

**Description.**—*Female from Virginia*: Cephalothorax yellow-white with brown spots and streaks; sternum spotted, legs with rings and spots. Abdomen white with a dark patch between humps; venter dusky, spotted. Eyes subequal in size. Anterior median eyes 1.3 diameters apart, 1.4 diameters from laterals. Posterior median eyes 1 diameter apart, 1.5 diameters from laterals. Height of clypeus equals 0.7 diameter of anterior median eye. Abdomen with a pair of dorsal humps with tubercles (Fig. 26). Total length 4.8 mm. Carapace 2.1 mm long, 1.8 wide, behind lateral eyes 0.9 wide. First femur 2.5 mm, patella and tibia 3.1, metatarsus 1.7, tarsus 0.7. Second patella and tibia 2.3 mm, third 1.2, fourth 1.8. Abdomen 4.1 mm high.

*Male from North Carolina*: Carapace yellowish, with eye area dusky, with a median dusky band, and with thoracic region having dusky margin. Chelicerae yellowish with dusky patch. Sternum with black marks. Legs with dusky rings and spots. Dorsum of abdomen white with a black patch between humps and scattered black spots of various sizes; venter dusky. Posterior median eyes 1.2 diameters of anterior medians, laterals 1 diameter. Anterior median eyes their diameter apart, their diameter from laterals. Posterior median eyes 0.5 diameter apart, 1 diameter from laterals. Height of clypeus equals 0.8 diameter of anterior median eye. Abdomen wid-

est in middle, humps slightly tubercular. Total length 2.6 mm. Carapace 1.38 mm long, 1.11 wide, 0.65 wide behind lateral eyes. First femur 1.61 mm, patella and tibia 1.96, metatarsus 1.47, tarsus 0.36. Second patella and tibia 1.54 mm, third 0.87, fourth 1.01. Abdomen 1.87 mm high.

**Note:** Males and females were matched because of similarly shaped abdomens and because both were collected in the same areas of the United States (Map 2).

**Variation:** Total length of females 4.8–7.2 mm, males 2.6–2.9. Female abdomens 4.1–8.2 mm high. Illustrations were made from a female from Virginia and a male from North Carolina.

**Diagnosis.**—As in *K. altiventer*, females of *K. alba* lack posterior humps or tubercles on the abdomen (Fig. 26) but differ by the vertical keel of the epigynum (Figs. 23–25). The median apophysis of the male palpus differs from that of *K. alba* in having six or more teeth (Figs. 27, 28), and the conductor differs from that of *K. altiventer* in being longest on the side closest to the median apophysis (C in Fig. 28).

**Natural History.**—Observations are given in the introduction to the genus.

**Distribution.**—Virginia to Mexico (Map 2).

**Additional specimen examined.**—UNITED STATES. *Virginia*: Black Pond [?], 14 Sept. 1913, ♀ (USNM).

*Kaira gibberosa* O. P.-Cambridge

Figures 29–47; Map 1

*Kaira gibberosa* O. P.-Cambridge, 1890:57, pl. 3, fig. 12, ♀. Female holotype from Veragua [Veraguas Prov.], Panama, in BMNH, examined. Keyserling, 1892:63, pl. 3, fig. 49, ♀. F. O. P.-Cambridge, 1904: 522, pl. 51, fig. 9, ♀. Roewer, 1942: 904.

*Kaira obtusa* Keyserling, 1892:66, pl.3, fig. 51, imm. Immature holotype from Taquara, Rio Grande do Sul, in BMNH, examined. Roewer, 1942:904. NEW SYNONYMY.

? *Macpos monstrosus* Mello-Leitão, 1940:59, fig. 6, ♀. Female holotype from Jardim Botânico, Rio de Janeiro, Brazil in MNRJ, lost. DOUBTFUL NEW SYNONYMY.

*Wagneriana minutissima* Mello-Leitão, 1941b:250. Male holotype from Rio Negro, Paraná State, Brazil, in MNRJ, no. 58298, examined. Brignoli, 1983:281. NEW SYNONYMY.

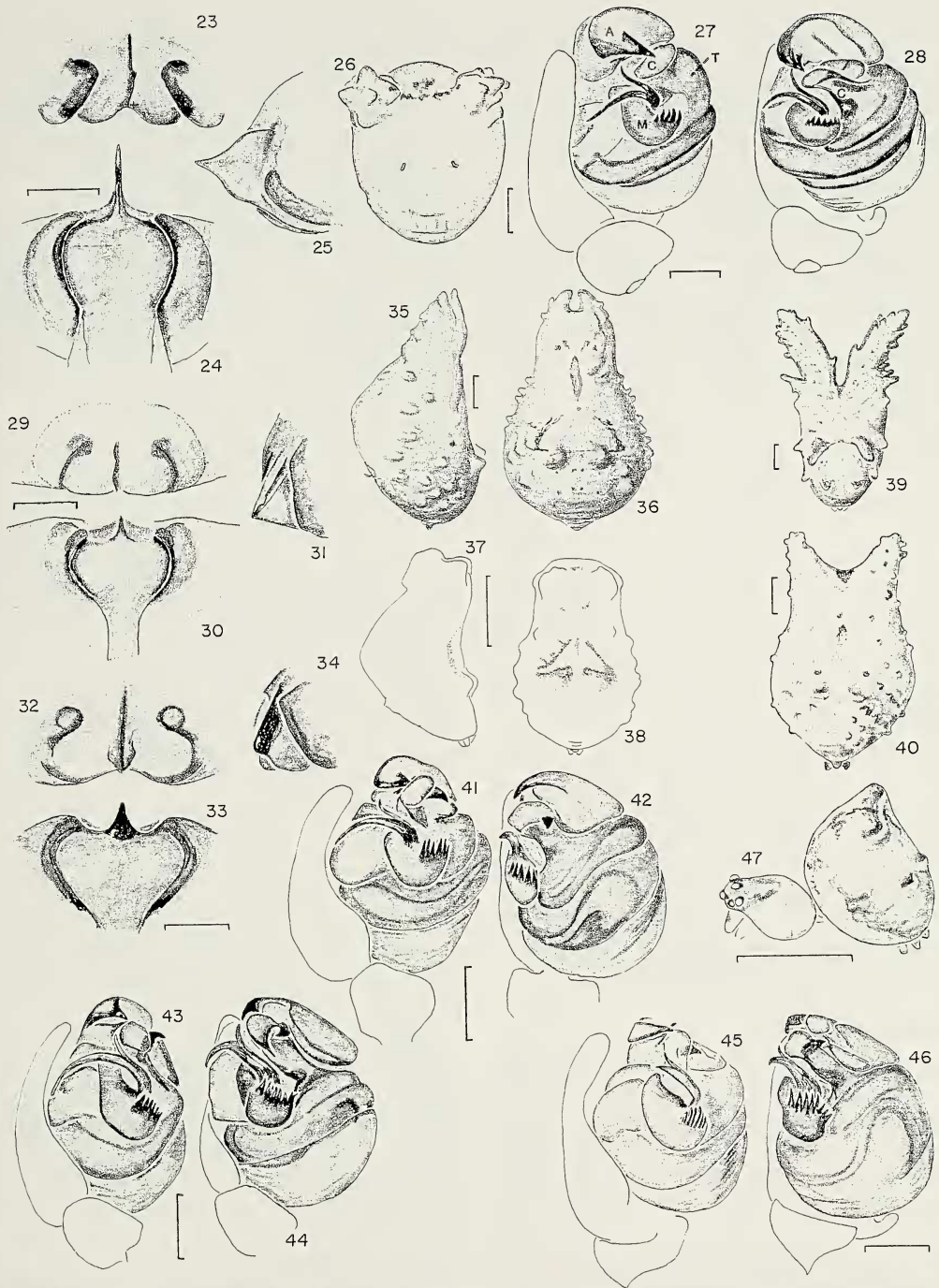
*Caira gibberosa*: - Bonnet, 1956:925.

*Caira obtusa*: - Bonnet, 1956:925.

*Kaira monstrosa*: - Brignoli, 1983:271.

**Note:** The type locality of *K. gibberosa* is Veragua, Panama. Veragua refers to Veraguas Prov-





Figures 23–47.—*Kaira* species: *K. alba* (23–28); 23–26, female; 23–25, epigynum; 23, ventral; 24, posterior; 25, lateral; 26, abdomen, dorsal; 27, 28, left male palpus; 27, mesal; 28, ventral. *K. gibberosa* (29–47); 29–36, 39, female; 29–34, epigynum; 29, 32, ventral; 30, 33, posterior; 31, 34, lateral; 35, 36, 39, abdomen; 37, 38, 40, immature abdomen; 35, 37, lateral; 36, 38–40, posterior; 41–47, male; 41–46, palpus; 41, 43, 45, mesal; 42, 44, 46, ventral; 47, dorsolateral; 29–31, 35, 36, holotype of *K. gibberosa*; 39, holotype of *Macpos monstrosus* (after Mello-Leitão); 37, 38, immature holotype of *K. obtusa*; 40, penultimate female from Paraná State, Brazil; 45, 46, holotype of *K. minutissima*; 41, 42, from Michoacan State, Mexico; 43, 44, from Rio Grande do Sul State, Brazil. Abbreviations: A, terminal apophysis; C, conductor; M, median apophysis; T, tegulum. Scale lines = 1.0 mm, of genitalia = 0.1 mm.

ince, Panama (Selander & Vaurie, 1962). The fragmented holotype has insect-pin holes. It is larger (total length 6.0 mm, abdomen 7.0 mm high) than the specimen from Paraná State, Brazil, but the measurements of the carapace and legs are similar.

The holotype of *Kaira obtusa*, although immature, has anterior and posterior humps on the abdomen (Figs. 37, 38), as does *K. gibberosa*. This species seems relatively common in southern Brazil, the type locality of *K. obtusa*. The specimen has a total length of 3.0 mm. Carapace 1.40 mm long, 1.35 wide, behind lateral eyes 0.70 wide. First femur 1.59 mm, patella and tibia 1.95, metatarsus 1.01, tarsus 0.48. Second patella and tibia 1.49 mm, third 0.87, fourth 1.09. Abdomen (shrivelled) 3.0 mm high. The name *Kaira obtusa* was erroneously synonymized with *K. altiventer* by Levi, 1977.

The holotype of *Macpos monstrosus* has a total length of 6 mm, the first patella and tibia 5.5 mm (measurements from Mello-Leitão 1940) almost twice the length of the female of *K. gibberosa* illustrated. Mello-Leitão's illustration of the female from the side and the abdomen from posterior (Fig. 39) suggest that it may be this species, but the abdomen does not narrow dorsally and the anterior humps are almost as long as the abdomen below (Fig. 39).

According to Mello-Leitão (1941b), *Wagneriana minutissima* is described from a female, but the holotype and description are of a male. The holotype resembles the male illustrated (Figs. 45, 46) but is poorly preserved and the median apophysis flagellae of the left palpus are broken off.

**Description.**—*Female from Paraná State, Brazil:* The animal is heavily pigmented with brown spots, some black and white streaks, cephalic region darkest. Sternum dusky orange. Legs spotted and streaked, distal ends of femora and patellae dark brownish black with white streaks. Dorsum of abdomen dark between humps and posteriorly with a black chevron pointing anteriorly (Figs. 35, 36). Eyes subequal in size. Anterior median eyes 1.3 diameters apart, 1.8 diameters from laterals. Posterior median eyes 1.2 diameters apart, 2.5 diameters from laterals. Height of clypeus 0.7 diameter of anterior median eye. Abdomen with two pairs of humps and tubercles on sides of abdomen (Fig. 35–40). Total length 5.2 mm. Carapace 2.5 mm long, 2.1 wide, behind lateral eyes 1.2 wide. First femur 2.8 mm,

patella and tibia 3.6, metatarsus 1.7, tarsus 0.7. Second patella and tibia 2.6 mm, third 1.5, fourth 2.1. Abdomen (shrivelled) 4.6 mm high.

*Male from Vacaria, Rio Grande do Sul State:* Carapace pale yellowish white with white streaks, a dusky patch covering cephalic region (Fig. 47). Sternum pale light yellowish, appearing spotted. Legs pale yellowish with distal halves of femora and patellae dark dusky. Abdomen with white line behind and around anterior protrusions, darker patches on paired posterior swellings with white mark behind; sides darker; venter pale (Fig. 47). Eyes subequal in size. Anterior median eyes 0.8 diameter apart, 0.7 diameter from laterals. Posterior median eyes 0.9 diameter apart, 1.5 diameters from laterals. Height of clypeus equal to 0.5 diameter of anterior median eye. Abdomen with a pair of diagonal, dorsal humps and pair of smaller posterior humps (Fig. 47). Total length 2.0 mm. Carapace 0.91 mm long, 0.83 wide, behind lateral eyes 0.47 wide. First femur 0.88 mm, patella and tibia 1.53, metatarsus 0.58, tarsus 0.41. Second patella and tibia 0.87 mm, third 0.52, fourth 0.69. Abdomen 1.46 mm high.

*Note:* Males and females were matched because they were collected in the same area and both have a posterior pair of humps on the abdomen (Figs. 35–40, 47).

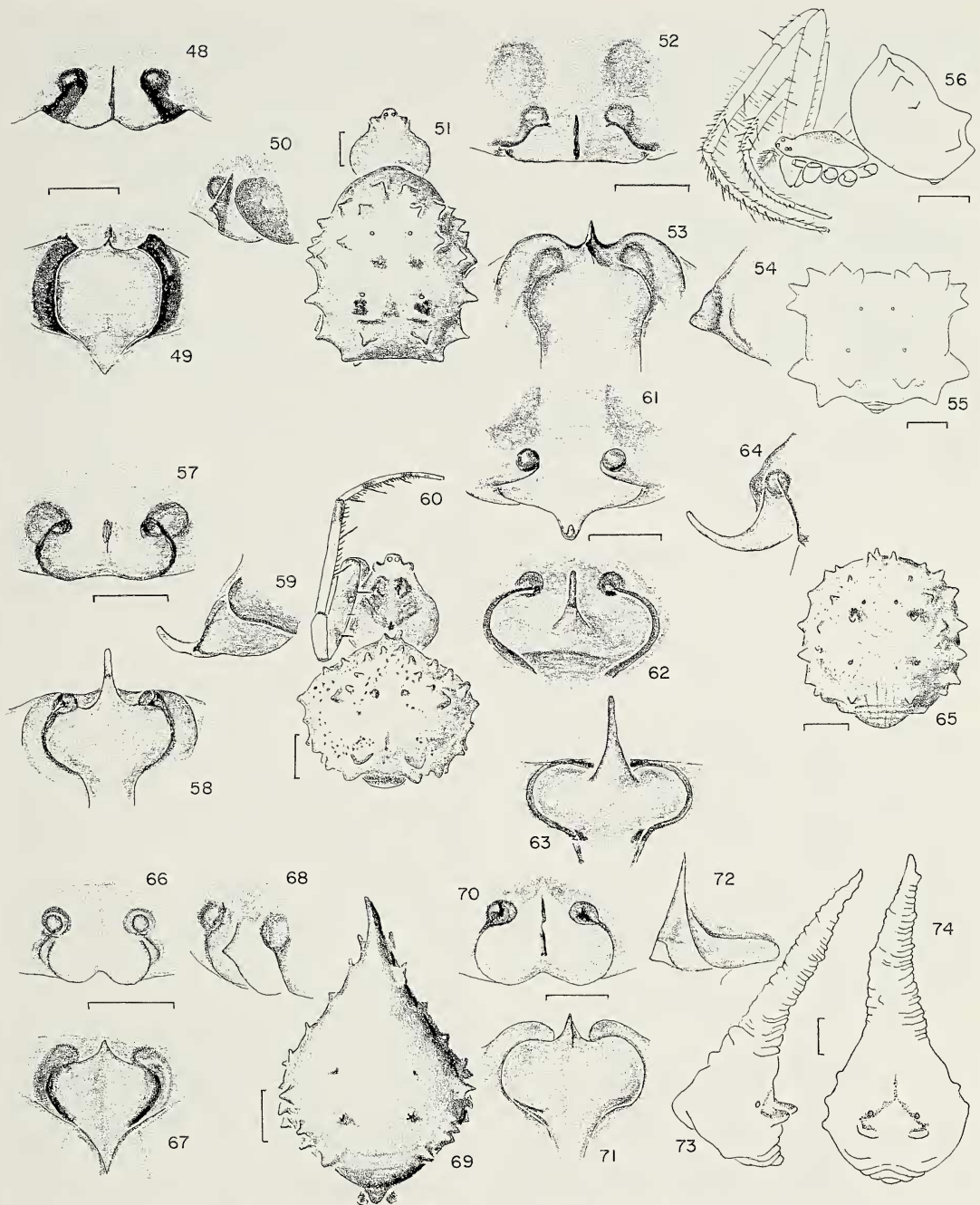
*Variation:* Total length of females 5.2 to 8.0 mm, abdomen 4.6 to 8.0 mm high. Illustrations were made from a female from Paraná State and male from Vacaria, Rio Grande do Sul. In the male from Michoacan State, Mexico, the conductor of the palpus (Fig. 42) is shorter than in males from southern Brazil (Figs. 43–46). I assume they belong to one species.

**Diagnosis.**—The female differs from other species of *Kaira* by having a longitudinal, keel-shaped scape in the epigynum (Figs. 23–25, 29–34) and by having a second pair of dorsal tuberculate humps on the abdomen, and tubercles on the posterior humps and on the sides (Figs. 35–40). The male is separated from others by having a distal black tooth on the conductor of the palpus (Figs. 41–46).

**Distribution.**—Mexico to southern Brazil (Map 1).

**Specimens examined.**—MEXICO. *Michoacan:* 78 km SE Aquila, 13 July 1984, ♂, doubtful determ. (J. B. Woolley, MCZ.). PANAMA. *Panamá:* Summit, Aug. 1950, 2 imm., 19 Aug. 1954, imm. (A. M. Chickering, MCZ.). BRAZIL. *Paraná:* Rolândia, May 1947, 2 penult. ♀, 1948, ♀ (A. Maller, AMNH). *Santa Catarina:*





Figures 48-74.—*Kaira* species: *K. tulua*, female (48-51); 48-50, epigynum; 48, ventral; 49, posterior; 50, lateral; 51, dorsal. *K. erwini*, female (52-56); 52-54, epigynum; 52, ventral; 53, posterior; 54, lateral; 55, abdomen, posterior; 56, lateral. *K. shinguito*, female (57-60); 57-59, epigynum; 57, ventral; 58, posterior; 59, lateral; 60, dorsal. *K. diana*e, female (61-65); 61-64, epigynum; 61, anterior; 62, ventral; 63, posterior; 64, lateral; 65, abdomen, posterior. *K. candidissima*, female (66-69); 66-68, epigynum; 66, ventral; 67, posterior; 68, lateral; 69, abdomen, posterior. *K. conica*, female (70-74); 70-72, epigynum; 70, ventral; 71, posterior; 72, lateral; 73, lateral; 74, posterior. Scale lines = 1.0 mm, of genitalia = 0.1 mm.

Pinhal, 700 m, May 1947, 2 penult. ♀ (A. Maller, AMNH). *Rio Grande do Sul*: Vacaria, 21–25 Apr. 1982, ♂ (A. A. Lise, MCN 10295); Porto Alegre, Morro Santana, 1 Sept. 1984, imm. (A. A. Lise, MCN).

***Kaira tulua*** new species

Figures 48–51; Map 2

**Holotype.**—Female holotype from Río Tuluá, 1100 m, Depto. Valle, Colombia, Aug. 1977 (W. Eberhard E-231), in MCZ. The specific name is a noun in apposition after the locality.

**Description.**—Female holotype. Carapace pale yellow-white with white spots. Chelicerae, labium, endites and sternum yellow-white. Legs pale yellow-white with a black spot on the anterior face of tibiae and tarsi. Dorsum of abdomen whitish with a pair of posterior black marks (Fig. 51); venter whitish. Posterior median eyes 0.8 diameter of anterior medians, laterals 0.8 diameter. Anterior median eyes 1.1 diameters apart, 1.8 diameters from laterals. Posterior median eyes 1.1 diameters apart, 2.8 diameters from laterals. Lateral eye tubercles distinct. Height of clypeus equals 0.8 diameter of anterior median eye. Abdomen without large protrusions, but covered with tubercles that are not symmetrical (Fig. 51). Total length 7.0 mm. Carapace 2.9 mm long, 2.7 wide, 1.2 behind lateral eyes. First femur 2.8 mm, patella and tibia 3.9, metatarsus 2.1, tarsus 1.0. Second patella and tibia 3.0 mm, third 1.8, fourth 2.5. Abdomen 5.8 mm high.

**Diagnosis.**—The round anterior profile of the abdomen, posteriorly truncate, and covered with tubercles (Fig. 51) distinguishes this species. The epigynum has a small keel with a posterior median plate as wide as long (Figs. 48–50).

***Kaira erwini*** new species

Fig. 52–56; Map 2

**Holotype.**—Female holotype from Río Samiria, Cocha Shinguito, Depto. Loreto, Peru, June 1990 (T. Erwin), in MUSM. The species is named after the collector, the entomologist T. Erwin.

**Description.**—*Female holotype*: Cephalothorax pale yellowish white with a brown stippled patch on the carapace and a brown spot on the posterior of second tibia. Dorsum of abdomen with white pigment spots; white pigment on venter and underside of tubercles. Eyes subequal in size. Anterior median eyes their diameter apart,

1.4 diameters from laterals. Posterior median eyes 0.8 diameter apart, 1.8 diameters from laterals. Height of clypeus equals diameter of anterior median eye. Abdomen wider than long, with five pairs of small humps anteriorly, three pairs posteriorly (Figs. 55, 56). Total length 4.3 mm. Carapace 2.1 mm long, 2.1 wide, 0.9 behind lateral eyes. First femur 3.1 mm, patella and tibia 3.6, metatarsus 2.2, tarsus 1.1. Second patella and tibia 2.5 mm, third 1.5, fourth 2.1. Abdomen 3.1 mm high.

*Variation*: Total length of females 4.0–5.0 mm.

**Diagnosis.**—*Kaira erwini* differs from *Kaira echinus* by the placement of the humps on the abdomen (Figs. 55, 56) and by having a long, keel-shaped, pointed scape on the epigynum (Figs. 52–54).

**Specimens examined.**—PERU. *Loreto*: Río Samiria, fogging, 20 May 1990, ♀ paratype (T. Erwin, D. Silva, MUSM). *Madre de Dios*: Tambopata, trocha del bamboo, 290 m, 7 June 1988, ♀ (D. Silva, MUSM); Albergue Cuzco Amazonica, 12°33'S, 69°03'W, 6 Mar. 1990, night coll., ♀ (D. Silva, MCZ).

***Kaira shinguito*** new species

Fig. 57–60; Map 2

**Holotype.**—Female holotype from Río Samiria, Cocha Shinguito [ox-bow lake], Depto. Loreto, Peru, 22 May 1990 (D. Silva D.), in MUSM. The specific name is a noun in apposition after the locality.

**Description.**—*Female holotype*: Carapace pale yellow-white, with a pair of brown patches containing darker veins surrounded by some white pigment spots, and a dark spot posteriorly. Chelicerae yellow-white with brown patches. Labium, endites yellow-white. Sternum brown. Coxae yellow-white with brown spot; legs yellow-white. Dorsum of abdomen yellow-white with some scattered small brown dots (Fig. 60); venter with five indistinctly separated brown bands between epigynum and spinnerets. Eyes subequal. Anterior median eyes 0.9 diameter apart, 1.2 diameters from laterals. Posterior median eyes 0.8 diameter apart, 2 diameters from laterals. Height of clypeus equals 0.6 diameter of anterior median eye. Abdomen subspherical with paired tubercles (Fig. 60). Total length 5.1 mm. Carapace 2.2 mm long, 2.1 wide, 1.1 behind lateral eyes. First femur 3.1 mm, patella and tibia 3.4, metatarsus 2.4, tarsus 1.1. Second patella and tibia 2.7 mm, third 1.6, fourth 2.0. Abdomen 3.7 mm high.



**Diagnosis.**—This female differs from those of other species by the shape of the abdomen (Fig. 60) and by the shape of the scape of the epigynum (Figs. 57–59).

*Kaira diana* new species

Figs. 61–65; Map 2

**Holotype.**—Female holotype from Zona Reservada Pakitza, on low leaf of tree, 356 m, Depto. Madre de Dios, 11°56'S, 71°17'W, Peru, 27 Sept. 1991 (D. Silva D.) in MUSM. The species is named after the collector.

**Description.**—*Female holotype:* Carapace pale yellowish white with brown and black speckles in cephalic region, eye region with white pigment, thoracic region with black border on sides. Chelicerae, labium, endites yellowish white. Sternum brown-black. Coxae, legs pale yellowish white with brown and black speckles and some white pigment. Dorsum of abdomen yellowish white, speckled with black and tiny white spots; a pair of black patches on anterior dorsal tubercles (Fig. 65); venter speckled. Eyes subequal in size. Anterior median eyes 0.8 diameter apart, 1.1 diameters from laterals. Posterior median eyes 0.6 diameter apart, 1.9 diameters from laterals. Height of clypeus equals 0.8 diameter of anterior median eye. Abdomen almost spherical, slightly longer than wide with tubercles, none quite symmetrical (Fig. 65). Total length 5.5 mm. Carapace 2.4 mm long, 2.3 wide, 1.1 behind lateral eyes. First femur 3.1 mm, patella and tibia 3.8, metatarsus 2.3, tarsus 1.1. Second patella and tibia 2.8 mm, third 1.7, fourth 2.2. Abdomen 4.2 mm high.

**Variation:** The immatures (of uncertain determination) have the sternum with light areas.

**Diagnosis.**—*Kaira diana* differs from *K. shinquito* by having a curved tubular scape on the epigynum (Figs. 61–64) and from other species by the subspherical, tuberculate abdomen (Fig. 65).

**Specimens examined.**—PERU. *Madre de Dios:* 15 km E Puerto Maldonado, 12°33'S, 69°03'W, 23–25 June 1989, 2 imm. (D. Silva D., MUSM).

*Kaira candidissima* (Mello-Leitão)

Figs. 66–69; Map 2

*Macpos candidissimus* Mello-Leitão, 1941c:212, figs.

18, 19, ♀. Female holotype from El Rabón, Santa Fé Province, Argentina, in MLP, no. 15135, examined.

*Kaira candidissima*: - Brignoli, 1983:271.

**Description.**—*Female holotype:* Carapace, sternum, legs pale yellow-white. Dorsum of abdomen white with sides and venter pale yellow-white. Eyes subequal in size, very small. Anterior median eyes slightly less than two diameters apart. Posterior median eyes slightly more than one diameter apart. Height of clypeus equals slightly more than one diameter of anterior median eye. Abdomen tapers dorsally to a single point (Fig. 69). Total length 6 mm. Carapace 2.6 mm long, 2.1 wide, behind lateral eyes 1.0 wide. First femur 2.6 mm, patella and tibia 3.3, metatarsus 1.7, tarsus 1.4. Second patella and tibia 2.7 mm, third 1.7, fourth 2.0. Abdomen 6.2 mm high.

**Diagnosis.**—The female differs from *K. conica* by having smaller eyes, a drop-shaped abdomen (Fig. 69) and the sternum widest between second and third coxa.

*Kaira conica* Gerschman & Schiapelli

Figs. 70–74; Map 2

*Kaira conica* Gerschman & Schiapelli, 1948:11, fig. 11–13, ♀. Female holotype from Santa María, Misiones Prov., Argentina, in MACN, examined. Brignoli, 1983:271.

**Description.**—*Female holotype:* Cephalothorax pale yellowish, cephalic region with some orange meandering marks. Chelicerae dusky proximally. Sternum light dusky. Femora with small black spots and distal black ring; patellae black ventrally. Abdomen white with anterior median black line below tip; posterior protuberances with black marks (Figs. 73, 74); venter without marks. Posterior median eyes 1.1 diameters of anterior medians, laterals 1 diameter. Anterior median eyes 1.3 diameters apart, 2.1 diameters from laterals. Posterior median eyes 1.1 diameters apart, 3 diameters from laterals. Ocular quadrangle square. Height of clypeus equals 0.7 diameter of anterior median eye. Abdomen drawn out to a single point, with two posterior bulges and tubercles (Figs. 73, 74). Total length 5.8. Carapace 3.1 mm long, 2.5 wide, 1.3 wide behind lateral eyes. First femur 3.2 mm, patella and tibia 4.1, metatarsus 2.0, tarsus 0.9. Second patella and tibia 3.1 mm, third 1.8, fourth 2.7. Abdomen 10 mm high.

**Diagnosis.**—*Kaira conica* differs from *K. candidissima* by having larger eyes, a longer abdomen (Figs. 73, 74) and a narrower sternum, which is as wide between the second and third coxa as between the first and second.

**Specimens examined.**—**BRAZIL.** *São Paulo:* Piracicaba, ♀ (MNRJ). *Rio Grande do Sul:* General Câmara, 19 Oct. 1982, imm. (E. H. Buckup, MCN 10902).

*Kaira echinus* Simon  
Figs. 75–81; Map 2

*Caira echinus* Simon, 1895:478. Female holotype from Rio Salobro, Prov. Bahia [Bahia State], Brazil, in MNHN no. 8338, examined. Bonnet, 1956:925.

*Kaira echinus:* - Roewer, 1942:904.

**Description.**—*Female holotype:* Carapace orange-white with a dark reticulated patch on each side of cephalic region. Chelicerae, labium, endites orange-white. Sternum brownish black. Coxae, legs orange-white with black spots and patches. Dorsum of abdomen white with dusky and black spots and a pair of anterior black patches (Fig. 78); venter with black spots on white. Eyes subequal. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Height of clypeus equals 1.5 diameters of anterior median eye. Abdomen with humps and numerous paired tubercles of different lengths (Fig. 78). Total length 6.5 mm. Carapace 2.7 mm long, 2.5 wide, 1.2 behind lateral eyes. First femur 3.4 mm, patella and tibia 4.4, metatarsus 2.7, tarsus 1.1. Second patella and tibia 3.1 mm, third 2.0, fourth 2.5. Abdomen (estimate) 5.3 mm high.

*Male from Paraná State, Brazil:* Carapace brown, spotted with black and some yellowish patches. Sternum brown, black patches. Legs yellowish with brownish black rings. Dorsum of abdomen brown with black spots and patches (Fig. 81). Posterior median eyes 1.3 diameters of anterior medians, anterior laterals one diameter, posterior laterals one. Anterior median eyes 2.5 diameters apart, 2 diameters from laterals. Posterior median eyes 1.5 diameters apart, 1.5 diameters from laterals. Ocular quadrangle almost square, very slightly wider than long. Height of clypeus equal to 1 diameter of anterior median eye. Abdomen wider than long, with humps and paired tubercles (Fig. 81). Total length 2.5 mm. Carapace 1.40 mm long, 1.20 wide, 0.65 behind lateral eyes. First femur 1.62 mm, patella and tibia 1.89, metatarsus 1.14, tarsus 0.60. Second patella and tibia 1.56 mm, third 0.88, fourth 1.06. Abdomen 1.98 mm high.

*Note:* Males were matched with females because both have an abdomen that is wider than long.

*Variation:* Total length of males 2.3 to 2.6.

Illustrations were made from the female holotype and a male from Paraná State.

**Diagnosis.**—The shape of the abdomen and its dark coloration separate the female from others. The eight teeth of the median apophysis and the row of denticles of the conductor of the palpus separate the male.

**Specimens examined.**—**BRAZIL.** *Paraná:* Guarapuava, Estância Santa Clara, 22 Nov. 1987, ♂ (A. D. Brescovit, MCN 17122). *Rio Grande do Sul:* Viamão, Morro do Côco, 9 Dec. 1982, ♂ (A. A. Lise, MCN 11308). **ARGENTINA.** *Misiones:* Eldorado, 1 Sept.–15 Nov. 1964, ♂ (A. Kovacs, AMNH).

*Kaira hiteae* Levi  
Figs. 82–85; Map 2

*Kaira hiteae* Levi, 1977:220, figs. 138–140, ♂. Male holotype from Cove Creek Valley, 9.3 km W of Prairie Grove, Washington County, Arkansas, in MCZ. Brignoli, 1983:271.

**Description.**—*Female from southern Texas:* Carapace pale yellow-white with scattered dark spots on cephalic region. Chelicerae pale yellowish with dusky spots. Labium, endites pale yellow. Sternum yellow. Coxae pale dusky yellow, legs yellow-white with brown rings and tiny brown spots. Anteriorly dorsum of abdomen dark between humps, posteriorly light, becoming darker, posteriorly except for a white transverse band (Fig. 85). Venter gray with tiny dark spots and white pigment spots. Eyes subequal. Anterior median eyes 1.3 diameters apart. Posterior median eyes their diameter apart. Posterior median eyes on slight swelling facing laterally and dorsally. Height of clypeus equals 1.5 diameters of anterior median eye. Chelicerae with three long teeth on anterior margin, three small teeth posterior. Abdomen shield-shaped (Fig. 85). Total length 6.2 mm. Carapace 2.8 mm long, 2.2 wide, 1.2 wide behind lateral eyes. First femur 3.4 mm, patella and tibia 4.3, metatarsus 2.5, tarsus 1.1. Second patella and tibia 3.1 mm, third 1.9, fourth 2.4. Abdomen 5.2 mm high.

*Male:* Description and illustration in Levi 1977: 220, figs. 138–140.

*Note:* Male and female have the abdomen similarly shaped.

**Diagnosis.**—The female is separated from other *Kaira* species by the shield-shaped abdomen (Fig. 85) and the triangular cross-section of the scape of the epigynum (Figs. 82–84).

**Distribution.**—Southeastern United States (Map 2).





Figures 75-92.—*Kaira* species: *K. echinus* (75-81); 75-78, female; 75-77, epigynum; 75, ventral; 76, posterior; 77, lateral; 78, dorsal; 79-81, male; 79, 80, left palpus; 79, mesal; 80, ventral; 81, dorsal. *K. hiteae*, female (82-85); 82-84, epigynum; 82, ventral; 83, posterior; 84, lateral; 85, dorsal. *K. cobimcha* (86-92); 86-89, female; 86-88, epigynum; 86, ventral; 87, posterior; 88, lateral; 89, dorsal; 90-92, male; 90, 91, palpus; 90, mesal; 91, ventral; 92, dorsal. Scale lines = 1.0 mm, of genitalia = 0.1 mm.

**Natural History.**—Padre Island, the collecting site of the female, is a xeric semibarren spit, windy and hot (W. Peck, pers. comm.).

**Specimen examined.**—TEXAS. *Cameron County*: South Padre Island, N Brazos Santiago Pass, sweeping vegetation, 10 Nov. 1979, ♀ (T. Allison, MCZ).

***Kaira cobimcha* new species**

Figs. 86-92; Map 2

**Holotype.**—Male holotype from 260 km N of Xavantina, 12°49'S, 51°46'W, 400 m, Mato Grosso, Brazil (Xavantina-Cachimbo Expedi-

tion), in MCN ex MCZ. The specific name is an arbitrary combination of letters.

**Description.**—*Female*: Cephalothorax yellowish. Abdomen with a transverse dark area anterior of two humps, posteriorly with six dusky transverse lines (Fig. 89). Eyes subequal. Anterior median eyes 1 diameter apart, 2.5 diameters from laterals. Posterior median eyes 0.8 diameter apart, 3.2 diameters from laterals. Ocular quadrangle slightly narrower behind. Height of clypeus equals 1 diameter of anterior median eye. Abdomen shield-shaped, wider than long (Fig. 89). Total length 8.0 mm. Carapace 3.3 mm long, 3.1 wide, 1.3 behind lateral eyes. First femur 3.5, patella and tibia 4.9, metatarsus 2.5, tarsus 1.1. Second patella and tibia 3.7, third 2.1, fourth 2.9. Abdomen 5.5 mm high.

*Male holotype*: Carapace brown. Chelicerae, labium, endites brown. Sternum brown. Legs brown with white rings at proximal ends of third and fourth tarsi. Dorsum of abdomen mostly brown; anterior shield starting between humps, area posterior of shield black (Fig. 92). Venter black. Posterior median eyes 1.3 diameters of anterior medians, laterals 0.8 diameter. Anterior median eyes their diameter apart, 1.2 diameters from laterals. Posterior median eyes 0.8 diameter apart, 1.3 diameters from laterals. Ocular quadrangle square. Height of clypeus equals 0.7 diameter of anterior median eye. Abdomen shield-shaped, completely covered by a scutum anteriorly, with some tiny sclerotized spots posteriorly (Fig. 92). Scutum with punctate texture. Total length 1.8 mm. Carapace 0.92 mm long, 0.81 wide, 0.42 wide behind lateral eyes. First femur 1.08 mm (distal articles and second legs lost). Third patella and tibia 0.62 mm, fourth 0.75. Abdomen 1.26 mm high.

*Note*: The female was matched to the male because of similarities in the shape of the abdomen (Figs. 89, 92). The abdomen of both were slightly lifted to make the illustrations.

**Diagnosis.**—The shape and markings of the abdomen (Fig. 89) resembles that of *K. sexta*. The epigynum differs by having two anterior transverse bars in ventral view (Fig. 86), *K. sexta* shows only corners of the anterior bar (Levi 1991, fig. 339). The scape is hidden by setae. The male differs from others by the sclerotized plate on the abdomen (Fig. 92), and the shape of the conductor (center to 1100 h in Fig. 91).

**Natural history.**—The holotype was collected in campo-grassland.

**Specimen examined.**—**BRAZIL.** *Rio Grande do Sul:* Santa Maria, 10 Nov. 1990, ♀ (Linck, MCP).

*Kaira sexta* (Chamberlin), new combination  
Map 2

*Aranea sexta* Chamberlin, 1916:255, pl. 19, fig. 7, imm.

Immature female holotype from Panama, in MCZ, examined. Roewer, 1942:852.

*Araneus sextus*: Bonnet, 1955:598. Levi, 1991:259, figs. 339–342, ♀, ♂.

*Note*: The shape of the abdomen in females of *K. hiteae* and of *K. cobimcha* called to mind the strikingly similar *Araneus sextus*. On reexamination, *A. sextus* was found to have the legs modified as in species of *Kaira*, and is now transferred. The abdomen of *K. sexta* is the same shape as that of *K. cobimcha* (Fig. 89); the shape of the genitalia separate the species.

*Kaira sabino* Levi  
Map 2

*Kaira sabino* Levi, 1977:221, figs. 141–147, map 3. Female holotype from Sabino [?Canyon, Pima County], Arizona in MCZ.

**Distribution.**—Southern Arizona.

LITERATURE CITED

- Bonnet, P. 1956. *Bibliographia Araneorum*. Toulouse 2 (2):919–1925.
- Brignoli, P. 1983. A catalogue of the Araneae described between 1940 and 1981. Manchester Univ. Press, Manchester, 755 pp.
- Cambridge, F. P.- 1897–1905. Arachnida, Araneidea and Opiliones. 2:1–610. *In* *Biologia Centrali-Americana*, Zoologia, London.
- Cambridge, O. P.- 1889–1902. Arachnida, Araneidea. 1:1–317. *In* *Biologia Centrali-Americana*, Zoologia, London.
- Coddington, J. 1986. The genera of the spider family Theridiosomatidae. *Smithsonian Contrib. Zool.*, 422:1–96.
- Gerschman de Pikelin, B. S., & R. D. Schiapelli. 1948. Arañas Argentinas II. *Comunicaciones del Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”*, Serie Ciencias Zoológicas, 1(4):1–20.
- Hentz, N. M. 1850. Descriptions and figures of the Araneides of the United States. *Boston J. Natur. Hist.*, 6:18–35.
- Keyserling, E. 1883. *Neue Spinnen aus Amerika*. *Verhandlungen der k. k. zoologisch-botanischen Gesellsch. Wien*, 32:195–226.
- Keyserling, E. 1892–1893. *Die Spinnen Amerikas*, Epeiridae. Nürnberg, 4:1–377.



- Levi, H. W. 1977. The orb-weaver genera *Metepeira*, *Kaira*, and *Aculepeira* in America north of Mexico (Araneae: Araneidae). *Bull. Mus. Comp. Zool.*, 148: 185–238.
- Levi, H. W. 1991. The Neotropical and Mexican species of the orb-weaver genera *Araneus*, *Dubiepeira* and *Aculepeira*. *Bull. Mus. Comp. Zool.*, 152: 167–315.
- Levi, H. W. 1993. The Neotropical orb-weaving spiders of the genera *Wixia*, *Pozonia* and *Ocrepeira* (Araneae: Araneidae). *Bull. Mus. Comp. Zool.*, 153: 47–141.
- Mello-Leitão, C. F. de 1937. Aranhas novas ou raras. *Annaes da Academia Brasileira de Sciencias*, 9 (1): 1–12.
- Mello-Leitão, C. F. de 1940. Tres curiosos Argiopidae do Brasil. *Revista Chilena de Hist. Natur.*, 43: 57–62.
- Mello-Leitão, C. F. de 1941a. Notas sobre a sistematica das aranhas com descrições de algumas novas especies sud-americanas. *Anais Acad. Brasileira de Ciencias*. 13:103–127.
- Mello-Leitão, C. F. de 1941b. Aranhas do Paraná. *Archivos Instituto Biológico São Paulo*, 11(30):235–257.
- Mello-Leitão, C. F. de 1941c. Arañas de la provincia de Santa Fé coligidas por el Profesor Birabén. *Revista del Museo de la Plata (Nueva Serie) Zoología*, 2:199–225.
- Mello-Leitão, C. F. de 1943. Catálogo das aranhas do Rio Grande do Sul. *Archivos do Museu nacional, Rio de Janeiro*, 37:147–245.
- Roewer, C. F. 1942. *Katalog der Araneae von 1758 bis 1940*. Bremen, 1:1–1040.
- Selander, R. B. & Vaurie, P. 1962. A Gazetteer to accompany the "Insecta" Volumes of the "Biologia Centrali-Americana." *American Museum Novitates*, no.2099:1–70.
- Simon, E. 1895. *Histoire Naturelle des Araignées*. Paris, 1:761–1084.
- Simon, E. 1897. *Etudes arachnologiques. 27e Mémoire. XLII. Descriptions d'espèces nouvelles de l'ordre des Araneae*. *Annal. Soc. entomol. France*, 65:465–510.
- Stowe, M. 1986. Prey specialization in the Araneidae. *In Spiders: Webs, Behavior and Evolution*. (Shear, W. A., ed.) Stanford Univ. Press, Stanford, California, pp. 101–131.

*Manuscript received 10 January 1993, revised 1 July 1993.*